

# T I M E L I N E

## AVHRR TIME SERIES PROCESSING FOR EUROPE

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### TIMELINE Background Information

The TIMELINE project aims at the development of a processing and data management environment to reprocess 30 years of NOAA-AVHRR raw data into L1b, L2, and L3 products on the basis of 1.1 km HRPT (High Resolution Picture Transmission) and LAC (Local Area Coverage) format. From these data a palette of highest level products (statistical information products) will be deducted to enable global change related research in the European and Mediterranean context. All the products will be provided online to a wider community from research and industry, as well as to the general public using a free and open data policy.

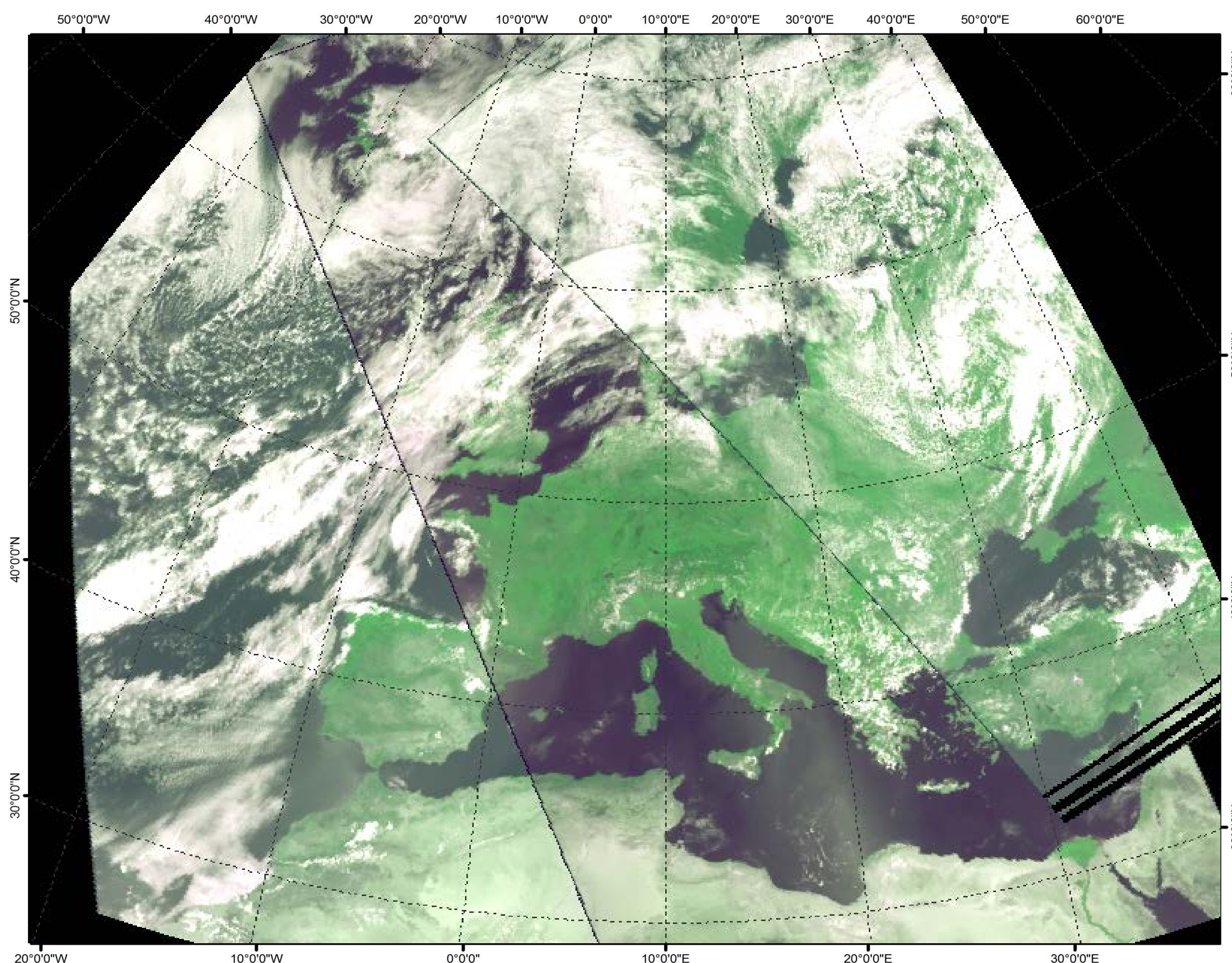


Fig. 1: Overview of the processing extent

### Products

The range of provided products is extensive and includes L1 (Radiance, Reflectance, Brightness Temperature), L2 and L3 variables (Snow/Sea Ice Cover, LST, SST, NDVI, LAI, FAPAR, Water Masks, Fire Hot Spots, Burnt Area, Albedo, Cloud Masks, and various Cloud Products) in different spatial and temporal resolutions. The processing chain starts with a chip matching and orthorectification procedure and is followed either by an atmospheric correction module or by a revised and updated version of the APOLLO scheme (Kriebel et al., 2003) to mask clouds and to derive cloud physical products (cloud coverage, cloud phase, cloud top temperature, cloud optical depth, cloud effective radius, cloud water path).

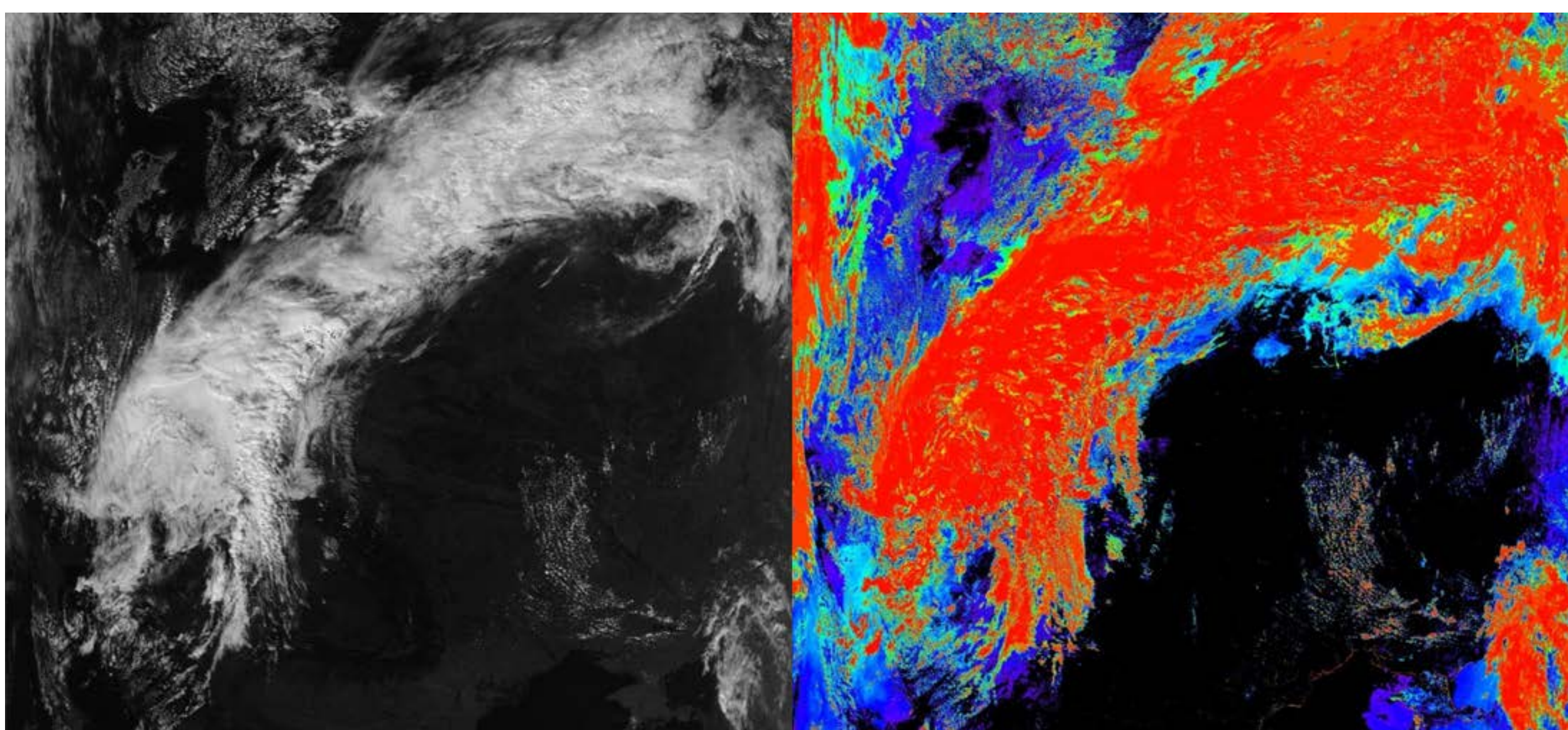


Fig. 2: Example of cloud products (unprojected)

### Snow Cover Product

Within TIMELINE, a modified version of SPARC (Separation of Pixels Using Aggregated Rating over Canada; Khlopenkov et al. 2006) is used to derive snow cover information from the imagery. A set of auxiliary data consisting of detailed land cover classifications, a dynamically updated water mask, and a high resolution digital elevation model is incorporated in the processing chain. Brightness Score, Temperature Score, and Reflectance Score are then calculated based on brightness temperatures, ground temperature information from ECMWF reanalysis data, and atmospherically corrected reflectances as well as the cloud masks. By including the APOLLO cloud masks the danger of confusions between clouds and snow is minimized as a double check on snow/cloud coverage is performed. The auxiliary data are combined with the different score results to produce the final snow product.

L2 (snow cover per orbit) as well as L3 (1km and 0.005°; daily and eight-day composites) snow cover products will be provided for the full time series of AVHRR data over Europe.

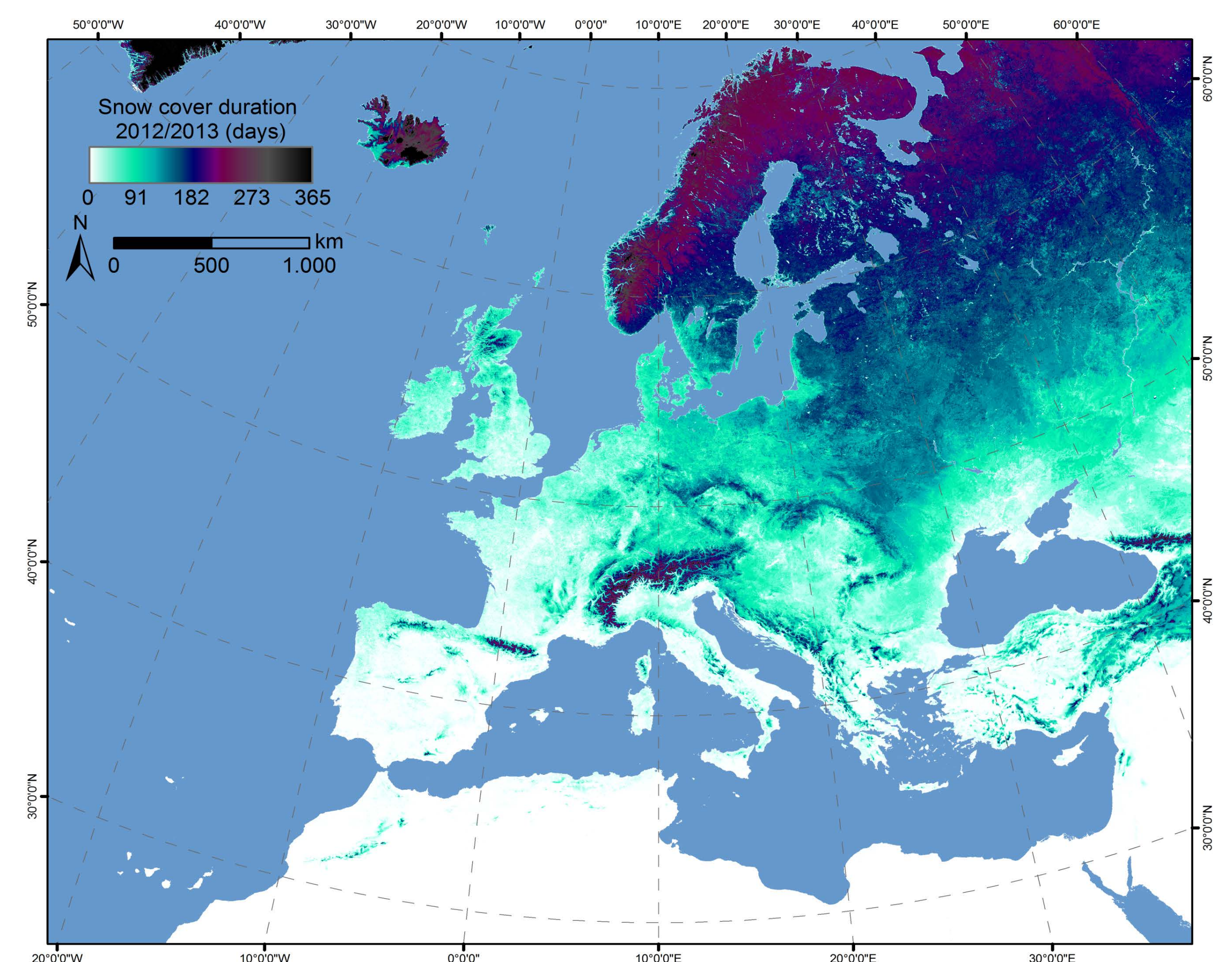


Fig. 3: Snow cover duration for Europe (2012/2013)

### References

Khlopenkov, K. V. and Trishchenko, A. P. (2006): SPARC: New Cloud, Snow, and Cloud Shadow Detection Scheme for Historical 1-km AVHRR Data over Canada, *Journal of Atmospheric and Oceanic Technology*, 24, pp. 322-343.

Kriebel, K. T., Gesell, G., Kästner, M., Mannstein, H. (2003): The cloud analysis tool APOLLO: Improvements and validations, *International Journal of Remote Sensing*, 24, pp. 2389-2408.

### Further information and contact

For additional information on the TIMELINE project, latest publications, conferences, and updates on the project and product status, please also refer to the TIMELINE homepage:

[www.timeline.dlr.de](http://www.timeline.dlr.de)

